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Food Consumption of College Men

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INTRODUCTION

Results of the physical examination of young men prior to induction into the armed forces have focused attention upon the need for improved physical condition of young men and have stimulated interest in the problem of improving food habits, important in building health and morale.

During normal times, the college population is large, and the dietary practices of college students assume importance, not only because of interest in good nutrition and the need for young people who are in excellent physical condition, but because the habits which students acquire during college days are likely to be carried over into later years. The young men and women enrolled as students are the potential leaders of the communities in which they live and to which they return after their college days are over. College students may, therefore, be considered as persons who hold key positions in bringing about desirable changes in food habits.

That college administrators are concerned with students' living and eating arrangements is shown by their providing residence halls for both men and women and their effort to have well-selected, well-prepared meals served to students at low and moderate costs, so that a student can select a good diet if he cares to do so. At The Ohio State University, at the time of the study reported, two types of men's residence halls were in operation. In one type there was a generous food budget; in the other the food budget was restricted. Approximately 500 men were housed and fed in each.

Although there have been a number of studies of the food intake of college women, little is known of the food habits of young college men. It was thought that such information would be of service in planning a program for improved food habits of college students and also in planning and carrying out a program for improved food habits of men in general.

During the academic year of 1941-1942, a study was made of the food intake habits of a representative group of men from each of the two types of residence halls for men at The Ohio State University. For the hall having the liberal food budget, Hall A, observations of 1 week each were made during each of three quarters—autumn, winter, and spring. In the hall having the restricted food budget, Hall B, observations were made for 1 week each during the autumn and winter quarters.

In order to give the students an opportunity to become adjusted to a dietary regimen which probably differed from that followed in their homes, observations were not started until the students had been in residence about a month, a period judged long enough to permit their becoming adjusted to the changed regimen. It was necessary to secure the cooperation of the young men whose diets were to be observed, and in doing so, the matter-of-fact attitude was taken that the students would continue their customary habits of eating.

During the autumn quarter the food intake was observed for 9 days. The records for the first 2 days were discarded, and those of the 7 succeeding days kept as representative, as it was thought that there might be a tendency among the young men to change their eating habits to conform to some supposedly approved pattern during the first days of the observation period. However, the foods used during the first 2 days differed so little in kind and amount from those used during the succeeding 7 days that during the winter and spring quarters, observations were limited to 7 days.

The cooperation of a group of approximately 50 young men from among the residents of Hall A was obtained. The men ranged in age from 18 to 25 years. Twenty-two per cent of the group were 18 or 19, and 57 per cent were 20 or 21 years old. Of the 67 young men who lived in Hall B whose food consumption was studied, 55 per cent were in the 18- to 19-, and 34 per cent in the 20- to 21-year age group. For both groups physical examination records were available in the office of the University Health Service. Through the courtesy and cooperation of the Director, a member of his staff had examined the records and indicated those men whose physical condition was such that they might be considered normal subjects. Only such men were included in the study.

The majority of the young men from Hall A were weighed and measured during the autumn quarter and again during the spring quarter. If the normal zone is considered as being from 10 per cent below to 10 per cent above the standard as given by Wood (18), 11 men, 20 per cent of the group, were overweight, and only 2 men, 4 per cent of the group, underweight in November 1941, shortly after observations were started. In June 1942, nine of those who were overweight in November were weighed, and of these nine, four were in the normal zone, and all but one of the others had lost some weight. The two underweight men weighed approximately the same in June as they had in November.

The men in Hall B were weighed during the autumn of 1941 only. Of the 67 men in the group, 12 per cent were above, and 6 per cent were below, the normal zone.

METHODS OF COLLECTING DATA

The men in Hall A whose food intakes were studied were served cafeteria style. As each man passed the cafetria counter and selected his food, an assistant checked and recorded the food chosen. Second helpings were also recorded, as well as any food left on the plates at the conclusion of the meal. The men also reported food eaten between meals.

The menus in Hall A were liberal and varied. A typical breakfast provided fruit or fruit juice; a choice between hot or cold cereal and a main dish, such as sausage, eggs, or bacon; toast or rolls and butter; jelly; and milk and (or) cocoa or coffee. For lunch, a choice was offered between two main dishes, such as creamed dried beef or meat or fish salad; among three vegetables, such as mashed potatoes, scalloped tomatoes, or buttered carrots, and salads, such as molded fruit salad or cole slaw; among desserts, such as lemon pie or fruit; beverages, such as milk, hot chocolate, or coffee; and breads, such as enriched, cracked wheat, whole wheat, or rye. The dinner menus differed little from those for lunch, except in the meat dishes. The variety of food offered was such that the only limitation upon the selection of an adequate diet was that imposed by the subjects themselves.

In Hall B, meals were served at the tables family style; one person at each table acted as host and served the others. A card listing the food items to be served was placed at each plate, and each man recorded the amounts of food he ate during each meal, as well as any food eaten between that meal and the preceding one. Immediately after meals, the records were collected and checked to see whether they were complete. The sizes of servings were well enough standardized that amounts used by different individuals were comparable.

Because Hall B was operated on a limited food budget, the menus were less varied than those served in Hall A, and little choice was offered the men. One day's menu, selected at random, provided the following: Breakfast—stewed apricots; wheatena; enriched, whole wheat, cracked wheat, and rye bread; butter; and milk, cocoa, or coffee. Lunch—two slices of bacon for each man; scalloped potatoes; head lettuce; bread; butter; and milk. Dinner—beef loaf; hashed brown potatoes; buttered peas; bread and butter; pumpkin pie; and milk or coffee.

METHODS OF EVALUATING THE ADEQUACY OF THE FOOD INTAKE

In assessing the adequacy of the diets used by the men included in the study, two methods were followed.

In the first method, use was made of the master food plans developed by the Bureau of Home Economics of the United States Department of America (4). In these food plans, 11 food groups and the approximate amounts of foods to be used from each group are suggested for various levels of cost. The foods used by the men were, therefore, classified as follows: milk or its equivalent; potatoes and sweet potatoes; dried beans, peas, and nuts; tomatoes and citrus fruit; green, leafy, and yellow vegetables; other vegetables and fruits; eggs; lean meat, poultry, and fish; cereal products; fats; and sugar, syrup, and preserves. All recipes for made dishes were available, and it was, therefore, possible to estimate the amounts of each food from the various food groups used by the individual men and to compare the amounts actually used with the recommended amounts.

For Hall A, the plan for the adequate diet at moderate cost was used as the standard for comparison. For Hall B, the plan for the adequate diet at low cost was followed.

The second method used involved computation of the approximate nutritive values of the diets and comparison of the computed values with the daily allowances for men recommended by the Food and Nutrition Board of the National Research Council (10). In using this method a sampling was made of the diets by selecting every fifth record for evaluation. For Hall A, with its group of approximately 50 men, the diets of 10 men were evaluated for observation periods of 7 days each during the autumn, winter, and spring quarters. For Hall B, observations were made during the autumn and winter quarters, and the food intakes for 10 men were evaluated for each of the two quarters.

RESULTS

FOODS USED AS COMPARED WITH FOODS RECOMMENDED

Milk, an excellent source of calcium, provides vitamin A and is a source of major importance of riboflavin in addition to other nutrients which it contains. As shown in table 1, most of the men used as much as or more than the weekly allowance of milk recommended in the food plans of the United States Bureau of Home Economics, an amount well over the 1 pint daily frequently suggested for adults.

TABLE 1.—Percentage of subjects using the weekly recommended allowances of milk, fruits, and vegetables

Season	Hall	Number of subjects	Milk	Citrus fruits and tomatoes	Leafy, green and yellow vegetables	Potatoes and sweet potatoes	Other fruits and vegetables
Autumn 1941.	A	54	89	41	76	57	56
Winter 1942	A	49	90	59	65	59	47
Spring 1942	A	45	89	78	93	38	42
Autumn 1941.....	B	67	99	60	48	0	79
Winter 1942.....	B	67	97	84	39	4	64
Total.....	.....	....	93	65	61	28	60
Recommended allowances	A..	... ...	5 quarts	2 pounds	3 pounds	3 pounds, 2 ounces	4 pounds
	B...	... .	4½ quarts	1 pound, 8 ounces	2 pounds, 4 ounces	5 pounds	2 pounds

Citrus fruits and tomatoes are important sources of vitamin C and are the foods usually depended upon in Ohio for vitamin C provision in institution diets. The percentage of men (table 1) using the recommended weekly allowances of these foods was surprisingly small, considering their palatability, their availability, and the zest and enjoyment with which most persons eat them.

Leafy, green, and yellow vegetables are important sources of vitamin A value and of riboflavin, in addition to other values which they may have. As shown in table 1, a larger percentage of the men in Hall A than in Hall B availed themselves of the opportunity to use these important foods, but more than one-third of the entire group failed to eat the recommended amounts.

Potatoes and sweet potatoes are usually well liked by men, and the small percentage in each hall using the amount of the recommended allowance was surprising. The amount recommended for diets of moderate cost would provide one generous serving per day. Potatoes were usually served at both lunch and dinner in Hall A, and choice of the men themselves was the limiting factor in potato consumption. The amount of potatoes recommended for the low-cost diet would assume about two servings daily. In Hall B, potatoes were usually served once a day, and unless the men ate unusually large servings at the one meal, the recommended amount would not be used. It is not surprising, therefore, that none of the men during the autumn quarter and only 4 per cent of the men during the winter quarter ate as much as the recommended allowance.

TABLE 2.—Nutrients provided by milk and milk products, and fruits and vegetables (in percentages)

Season	Hall	Protein	Calories	Calcium	Iron	Vitamin A	Thiamin	Riboflavin	Niacin	Ascorbic acid
					Milk and Milk Products					
Autumn	A	29.5	26.8	77.5	12.7	21.1	24.2	61.5	13.2	
Winter	A	27.1	24.8	73.8	10.1	23.5	29.2	65.0	12.9	
Spring	A	31.5	28.3	78.0	13.7	14.5	25.5	65.7	15.5	
Autumn	B	28.6	24.7	73.4	11.2	17.8	20.9	67.8	13.8	
Winter	B	29.1	24.0	74.8	12.7	15.5	22.0	67.4	13.8	
					Fruits and Vegetables					
Autumn	A	9.9	13.5	7.9	26.2	48.3	28.3	11.4	21.1	100.0
Winter	A	12.6	15.1	10.2	29.8	44.0	29.1	14.2	22.4	100.0
Spring	A	10.1	13.2	8.5	28.6	53.9	29.6	12.9	18.8	99.8
Autumn	B	11.2	14.3	7.8	29 5	52.8	27.6	14.6	24.4	97.0
Winter	B	11.9	15.0	8.7	34.0	63.8	30.3	15.8	19.8	100.0
		40.3	39.9	84.1	41.7	71.1	51.6	79.3	35.1	99.4

Other fruits and vegetables were used in the recommended amounts by a larger percentage of the men in Hall B than in Hall A. To be sure, these foods are among the more expensive ones, and the amounts recommended for the diets of moderate cost exceeded the amounts recommended for diets of low cost.

Milk, fruits, and vegetables are so high in nutritive value that the extent to which these foods are present in the diet determines largely the adequacy of mineral and vitamin provision. As newer and more precise methods of appraising the nutritive value of diets and of assessing the nutrition of human beings have been developed, it has become evident that dietaries might well be improved in a number of factors. The outstanding need in a large part of the United States seems to be improved provision of calcium, ascorbic acid, riboflavin, and vitamin A (14). Increased use of the protective foods would improve dietaries in these nutrients.

As shown in table 2, practically all the ascorbic acid and approximately three-fourths of the calcium, riboflavin, and vitamin A of the diets of the subjects of the study here reported were provided by milk, fruits, and vegetables. The importance of the protective foods in the diets of the subjects is thus indicated.

Eggs are sometimes included among the protective foods and occupy a place of importance in the diet because of their contribution of vitamin A, riboflavin, thiamin, nicotinic acid, and protein of high biological value. As shown in table 3, there was considerable variation in percentages of men using the recommended allowance of eggs weekly. The two extremes were found in Hall B. With one exception, well over half the men in each hall had the recommended amounts during each of the quarters the diets were studied.

TABLE 3.—Percentage of subjects using the weekly recommended allowances of eggs and meat

Season	Hall	Number of subjects	Eggs	Meat, fish, poultry
Autumn	A	54	67	89
Winter	A	49	80	61
Spring	A	45	78	40
Autumn	B	67	96	84
Winter	B	67	18	82
Total		282	66	73
Recommended allowances	A		6	3 pounds
	B		3	2 pounds

Meat, poultry, and fish recommended for use in the moderate and the low-cost diets make possible 7 to 13 servings of such food per week. As meat and fish were usually served twice a day in Hall A, the percentage of men using the recommended allowance was surprisingly small, being less than that for the men in Hall B.

Cereal products, fats, and sugars are usually eaten in liberal amounts by men, but the percentage of subjects using the recommended weekly allowance of cereal products, including bread, macaroni or spaghetti, flour in cakes, hot breads, and similar foods, approximately the same for both halls and for all

periods of study, indicated that only slightly more than half the men were using the recommended amounts (table 4). Enriched bread and flour were used in the halls at the time the study was made.

TABLE 4.—Percentage of subjects using the weekly recommended allowances of cereal products, fats, and sugars

Season	Hall	Number of subjects	Cereal products	Fats	Sugars
Autumn	A	54	57	20	44
Winter	A	49	53	39	63
Spring	A	45	53	36	47
Autumn	B	67	57	22	46
Winter	B	67	52	69	58
Total	.....	.....	55	38	52
Recommended allowances	A	.....	3 pounds, 12 ounces	1 pound, 4 ounces	1 pound, 4 ounces
	B	.....	4 pounds, 4 ounces	1 pound	1 pound, 4 ounces

Less than half, 38 per cent of the entire group of men from Halls A and B together, used the recommended allowance of fat, and slightly more than half the men (52 per cent) used the recommended allowance for sugar and other sweet foods weekly.

Results of the study of the specific food groups used by the men whose food intakes were studied showed that the intake of milk was high and remained high during all periods of the study. The use of tomatoes and citrus fruits was variable and in many cases lower than was desirable. Less than half the men in Hall B were using recommended amounts of leafy, green, and yellow vegetables and potatoes, but well over half were using the recommended amounts of other fruits and vegetables. Surprisingly enough, only about three-fourths of the men were eating recommended amounts of the protein-rich foods, such as meat, fish, and poultry. Emphasis on the importance of fruits and vegetables, as well as of protein-rich foods, in nutrition-education programs for men seems indicated.

Figures showing trends in food consumption in the United States have shown a steadily increased per capita consumption of milk and milk products and citrus fruits, and a decreased per capita consumption of cereal products and potatoes, since 1909 (16). The increased use of milk by the population in general was reflected in the habits of the young men whose diets were studied. On the other hand, the increased use of citrus fruit and of vegetables by the general population was reflected in the food habits of only about two-thirds of the men. The downward trend in consumption of potatoes and cereal products of the general population seemed to be paralleled by the surprisingly large number of men who were using less than the recommended amounts of these foods.

A factor which may have had a bearing upon the limited use of such foods as citrus fruits and tomatoes and the cereal products was the frequency with which breakfasts were omitted by men from each of the halls. Table 5 shows that 13 to 27 per cent of the men from Hall A and almost half the men from Hall B had only five breakfasts or fewer a week. The citrus fruits and the

cereal products, either as cereal breakfast foods and (or) breadstuffs, are foods customarily used for breakfast, and omission of breakfast would limit the use of such foods.

TABLE 5.—Number of breakfasts eaten weekly as shown in 282 records

Season	Hall	Number of subjects	Seven		Six		Five or less	
			Number	Per cent	Number	Per cent	Number	Per cent
Autumn...	A	54	22	41	25	46	7	13
Winter ...	A	49	24	49	12	24	13	27
Spring.....	A	45	23	51	16	36	6	13
Autumn...	B	67	23	34	14	21	30	45
Winter ...	B	67	19	28	15	22	33	49
Total ...	.. ....	282	111	39	82	29	89	32

Comparison of the dietary habits of the men students of this study with those of a large group of women students recently reported (12) shows some interesting contrasts in the four important food groups. (See table 6 and fig. 1.) The liberal use of milk by men students is contrasted to the restricted use of milk by women students. Of the 3,342 young women whose food intakes were reported, only 32 per cent used as much as 1 pint of milk daily, whereas 93 per cent of the men students used 1 pint or more daily. The slight difference between the percentage of men and of women using the recommended amounts of green and yellow vegetables indicated similarity in their habits and also the need for education as to the value of such foods. In addition, the percentage of men using citrus fruits at least once daily was higher than the corresponding percentage of women doing so. An increased use of foods rich in vitamin C is desirable, and emphasis in teaching college students about adequate food selection might be placed on use of such foods. Contrary to what might have been expected, the percentage of men using meat, including fish and poultry, at least once a day was lower than for the women; the figures were 73 and 88 per cent, respectively.

TABLE 6.—Percentage of subjects using recommended amounts of each of five food groups

Subjects	Milk, at least 1 pint daily	Green and yellow vegetables, at least once daily	Citrus fruits and tomatoes, at least once daily	Meat, fish or poultry, at least once daily	Eggs, at least three times weekly
Men students*.	93	61	65	73	66
Women students†	32	54	41	87	.....
Aircraft workers‡.	51	21	36	.....	77
Men and women§	50	....	.....	97	70

*This study.
†Reynolds.
‡Wiehl (5 pints of milk weekly and at least six servings of green and yellow vegetables used as standards).
§Kelly and Sheppard.

That the food selected by the college men of this study was superior in nutritive value to that used by aircraft workers in southern California (17) was shown by the finding that only 51 per cent of the diets of the aircraft workers studied were adequate in the amount of milk included; 36 per cent in

citrus fruits or tomatoes; and 21 per cent in green or yellow vegetables. (See table 6 and fig. 1.) On the other hand, eggs were used somewhat more liberally by the aircraft workers than by the college students.

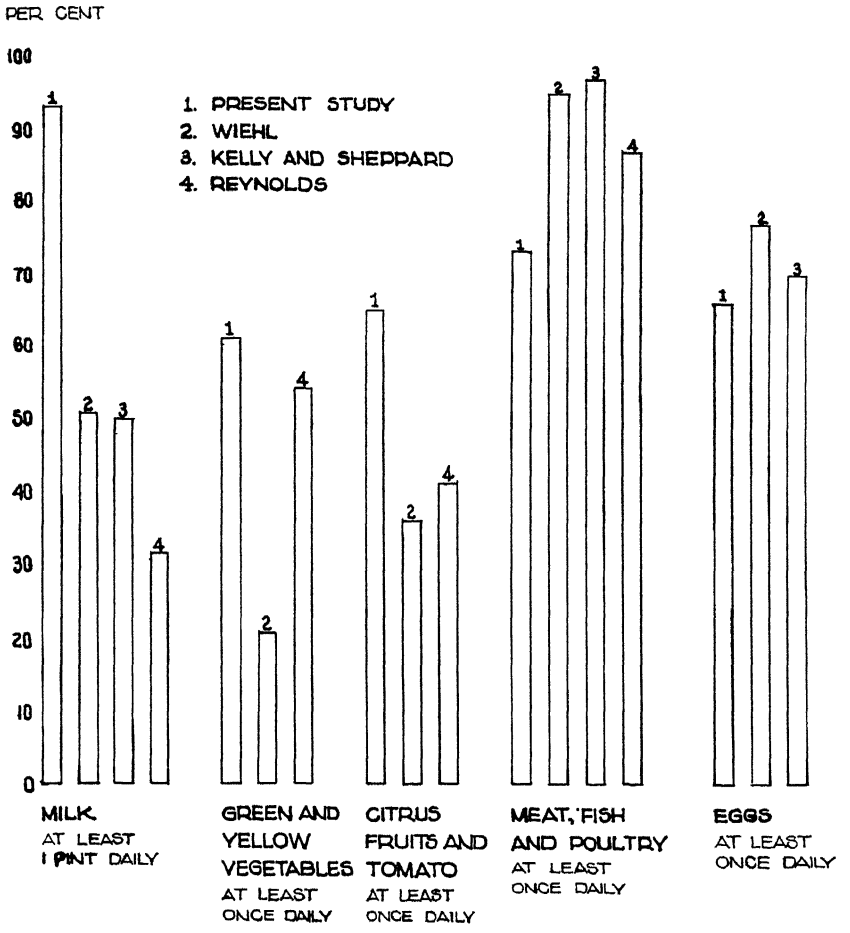

Fig. 1.—Percentage of subjects using recommended allowance of certain foods.

(For the Wiehl study at least 5 pints of milk, six servings of green and yellow vegetables, and five servings of meat per week were used as standards.)

Kelly and Sheppard's dietary study of 223 adults (men and women) including 20 physicians (7), all in the upper income brackets, showed that a smaller proportion of the subjects used milk and a larger percentage used meat and eggs in the recommended amounts than did The Ohio State University subjects. (See table 6 and fig. 1.)

FOOD INTAKES IN TERMS OF DIETARY ESSENTIALS

In attempting to arrive at an estimate of the nutritive value of the diets used, every fifth record was chosen for evaluation, and the nutritive value of the diet was computed for each of the quarters for which such records had been obtained. For Hall A, therefore, weekly records for 10 men for each of three quarters and for Hall B, weekly records of 10 men for each of two quarters, a total of 50 records, were evaluated. Figures of food composition were taken from a number of sources (1, 2, 3, 8, 13, 14, 15). In assessing the nutritive value of the diets, moderate activity for the men was assumed, and comparison was made with the daily allowances recommended by the Food and Nutrition Board of the National Research Council (10).

Protein, calcium, and iron intakes, as shown by mean figures for the groups (table 7), were well above the daily recommended allowances during all periods of the study. Of the 50 individual records evaluated, all showed adequate provisions for protein and iron and, except for one subject during one quarter, an adequate provision for calcium.

TABLE 7.—Mean calorie, protein, calcium, and iron values of foods used by subjects compared with those used by the United States Army and rural nonfarm families

Season	Hall	Calories	Protein, gm.	Calcium, gm.	Iron, mg.
Autumn	A	3,369	113	1.6	20
Winter	A	3,101	111	1.4	21
Spring	A	3,111	113	1.6	19
Autumn	B	2,844	102	1.3	18
Winter	B	2,766	92	1.3	16
Total mean		3,013	105	1.4	19
U. S. Army, August 1941–July 1942 (6)		3,888	124	.9	28
Rural nonfarm families, 1942 (11)		2,700	80	.9	14
Recommended daily allowances		3,000	70	.8	12

The liberal use of milk and vegetables, which provided 40 per cent of the protein, 84 per cent of the calcium, and 41 per cent of the iron, and the use of eggs, meat, and enriched bread evidently provided protein, calcium, and iron in liberal amounts.

Vitamin intakes, as indicated by mean figures for the group, are shown in table 8. At the present time, figures of the approximate vitamin values of foods are available for vitamin A, thiamin, riboflavin, niacin, and ascorbic acid, and it is assumed that when these are present in the diet in adequate amounts, other less well known vitamins are also provided. Table 8, showing the results of the computations, indicates that for Hall A, average intakes of vitamin A, thiamin, riboflavin, and ascorbic acid were well above the recommended allowances, and that the intake of niacin was just equal to the recommended allowance. For Hall B, mean vitamin A intakes were slightly below the recommended allowance during one period of the study, and riboflavin and niacin intakes were less than the recommended allowances during both periods. Inspection of individual records from each of the halls, however, made it evident that liberal intakes recorded for some of the men had influenced the mean figures to the extent that individual inadequacies were masked.

TABLE 8.—Mean vitamin values of foods used by subjects compared with those used by United States Army and rural nonfarm families

Season	Hall	Vitamin A, I. U.	Thiamin, mg.	Riboflavin, mg.	Niacin, mg.	Ascorbic acid, mg.
Autumn	A	9,224	2.2	3.4	19	78
Winter	A	6,146	2.3	2.9	18	99
Spring	A	7,758	2.2	3.3	18	106
Autumn	B	4,974	2.0	2.4	16	76
Winter	B	5,363	1.9	2.4	16	98
Total mean		6,528	2.1	2.8	17	90
U. S. Army, August 1941–July 1942		9,255	2.1	2.3	27	86
Rural nonfarm families, 1942		6,660	1.5	1.8	13	99
Recommended daily allowances		5,000	1.8	2.7	18	75

Of the 10 men from Hall A whose diets were evaluated for autumn, winter, and spring quarters, three had adequate and three had inadequate vitamin intakes during each of the three quarters; two subjects had adequate vitamin intakes for two quarters, and the remaining two had adequate vitamin intakes for one quarter only. Of the specific inadequacies, those of riboflavin and ascorbic acid were most frequent. Of the records of the 10 men for the three quarters, 15, or half of the 30 records, showed either single or multiple vitamin inadequacies. Of these, riboflavin or ascorbic acid deficiency or a combination including both was found in 14 cases. That only 15 of 30 records showed diets which were adequate in all factors was surprising, as the diets provided the men in Hall A were liberal and varied and were such that all the men had the opportunity to select a diet adequate in all factors. That only three men selected adequate diets during all three quartrs and that only two others had only a single vitamin deficiency during one of the three quarters gave evidence of lack of knowledge concerning the nutritive value of foods and the importance of good food selection or of inertia or indifference.

The men from Hall B had more vitamin deficiencies in their diets than did the men from Hall A. No subject from Hall B was adequately provided with vitamins during the two periods the diets were studied, and only two had adequate vitamin provision for one period each. Of the 20 records, 11 showed multiple vitamin inadequacies as compared with 7 which had single vitamin inadequacies. Of these 18 records, 6 showed ascorbic acid, and 14 showed riboflavin deficiencies, either alone or as part of multiple deficiencies. The diets provided the men in Hall B were neither as varied nor as liberal as those furnished the men in Hall A, and the influence of restrictions in diet, combined with ignorance, indifference, and inertia on the part of the men brought most of the diets below adequacy.

Calorie intakes in terms of mean figures for the groups are shown in table 7. Although attention has been centered on the vitamins in much of the modern discussion of diets, calories are still important, and in the provision of calories it is possible to make adequate provision for the minerals and vitamins. It seemed worthwhile, therefore, to consider the vitamin intakes in relation to the calorie intakes for any possible relationship there might be between the two. As shown in table 7, mean daily calorie intakes were adequate for the men in Hall A but not in Hall B.

Of the 30 individual records from Hall A which were evaluated, 23 (77 per cent) showed adequate provision for calories. Of these 23 records, 15 provided adequately for all the vitamins. Of the remaining eight records, three showed inadequacies in one vitamin only; four in two; and one in three vitamins (fig. 2). Adequate calorie intake was, therefore, associated with liberal vitamin intake.

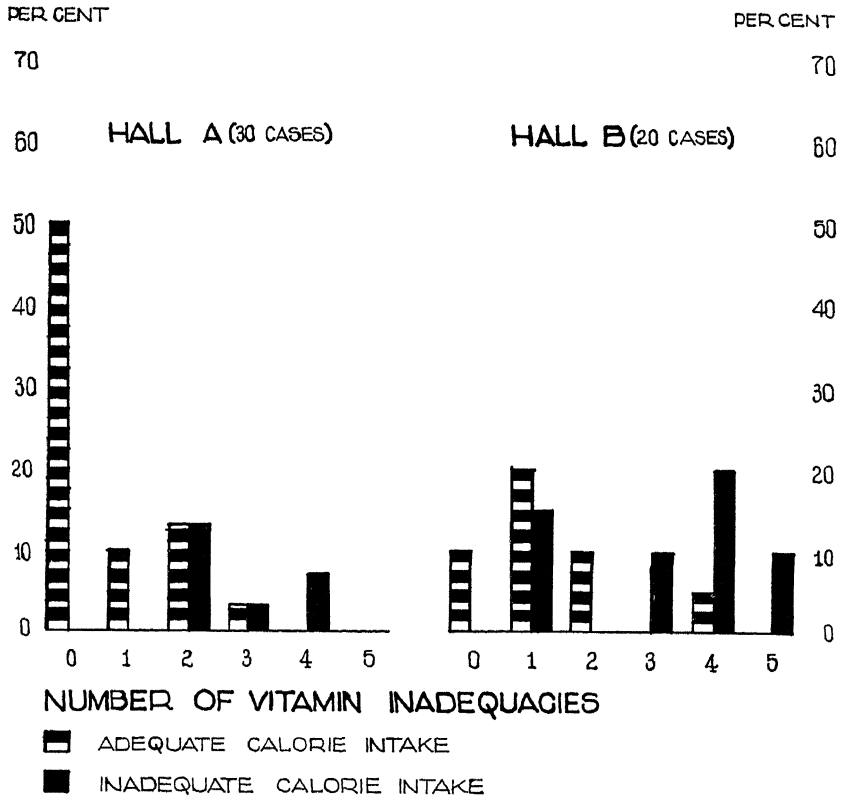

Fig. 2.—Adequacy of calorie intake as related to incidence of vitamin inadequacies

Seven (23 per cent) of the 30 records which were evaluated from Hall A showed calorie intakes decidedly below the recommended daily allowances. None of the seven records showed adequate provision for vitamins. All the vitamin A and thiamin, more than half the riboflavin and niacin, and one-fourth the ascorbic acid inadequacies found in the entire set of 30 records were concentrated into the 7 records showing calorie intakes below the recommended allowance. Fifty-eight per cent of the total number of vitamin inadequacies were found in the 23 per cent of the records in which low calorie intakes were shown.

For Hall B, only 9 of the 20 records which were evaluated showed adequate calorie provision. Of these nine, only two showed adequate provision for all the vitamins considered. Of the remaining seven records, however, four showed single, two double, and only one, quadruple vitamin inadequacies.

All the thiamin, 80 per cent of the ascorbic acid, two-thirds of the vitamin A and niacin, and one-fifth of the riboflavin inadequacies of the 20 records were found in the 11 records which showed inadequate calorie provision for Hall B. Sixty-two per cent of the vitamin inadequacies were found in the 55 per cent of the records which showed low calorie intakes (fig. 2).

Although for Hall B the vitamin inadequacies were more numerous than for Hall A, it is evident in both cases that an adequate calorie intake was associated with better vitamin provision than was the inadequate calorie intake.

The custom of omitting breakfasts seemed also to have a bearing on the inadequacies found in the food intake of the men studied. Of the 30 records from Hall A which were evaluated, 15 were adequate in all factors. For 66 per cent of these, seven breakfasts per week were recorded. For the 15 records in which single or multiple dietary inadequacies were found, only 40 per cent showed seven breakfasts per week.

Only two records from Hall B showed adequacy in all factors, and of these two, one indicated seven breakfasts. Eighteen records had single or multiple inadequacies, and only 28 per cent of these showed seven breakfasts a week.

Studies by Haggard and Greenberg (5) showed that workers who had breakfasts were more efficient than those who did not. There seems to be little doubt that education concerning the value of well-selected breakfasts is needed for men, as well as for women, students.

Except in the case of thiamin, for which the figures of Lane et al. (8) give thiamin values of prepared foods, the vitamin values used were for uncooked foods. Preparing, cooking, and holding of vegetables are notably destructive of ascorbic acid (9) and are also destructive of other vitamins to a smaller extent, so that the diets as eaten by the residents of each hall were undoubtedly considerably lower in vitamin provision than the amounts recorded would indicate.

Comparisons of the mean nutritive value of the diets used by the college men with that of diets used by the Unites States Army from August 1941 to July 1942 (6) and with diets purchased by rural nonfarm families in 1942 (11) are shown in tables 7 and 8. Calcium and riboflavin were used in larger amounts by the college men than by either the Army or the nonfarm rural families. The college men used amounts of thiamin similar to those used by the Army. Nonfarm rural families purchased diets containing more ascorbic acid than the amounts used by either the college men or the Army. All other factors were used in more liberal amounts by the Army than by the college men or the nonfarm rural families.

SUMMARY AND CONCLUSIONS

Of 282 food consumption records of young college men studied, the percentages showing the use of as much as, or more than, the weekly recommended allowances of specific food groups were as follows: milk, 93; meat, including poultry and fish, 73; eggs, citrus fruits, tomatoes, leafy green and yellow vegetables, 60-66; cereal products and sugar, 52-55; fat, 38; and potatoes, 28.

Results of computation of the nutritive value of the diets of every fifth man from Hall A for autumn, winter, and spring and for every fifth man for autumn and winter from Hall B were compared with the daily allowances of nutrients recommended by the Food and Nutrition Board of the National Research Council.

The results showed liberal provision for protein, calcium, and iron; inadequate calorie provision for 23 per cent of the cases in Hall A and 55 per cent of the cases from Hall B; vitamin inadequacies which showed riboflavin and ascorbic acid either alone or as part of multiple inadequacies in many cases. Inadequate calorie intakes were associated with multiple vitamin inadequacies.

The results justify the conclusion that a liberal and varied diet is a factor of safety in providing adequately for the food needs of young men and that education in food selection is needed by young college men.

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